COLL 198: Hands-On Electronics

Contact Information

Instructor: Nishant Verma
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Office Hours: Wednesday dinner 530-630 PM at Fairy Fountain (fountain between Jones and Brown). Also available by appointment.

Course Title: Hands-On Electronics
Faculty Sponsor: Dr Caleb Kemere

Course Description

What is inside an electronic device and how does it work? In this course, students will learn about common components inside electronic devices, how electronic devices work as a composite of these common components, and how electronic devices are manufactured – in a hands-on manner. The course will feature "teardowns" (disassembly) of electronic devices (e.g. printer, television, disposable camera, etc.). Students will work on a midterm teardown report as well as a final reconstruction project. Upon completion, students will be able to interpret datasheets and design and fabricate their own simple electronic devices. No prior electronics experience required.

Course Objective and Learning Outcomes

Skills-Based

1. Identify and explain the operation of discrete electronic component (resistors, capacitors, inductors, transistors, LED, etc.) in a device teardown.
2. Use a digital multimeter, oscilloscope, power supply, breadboard, soldering iron, and PCB design software EAGLE.
3. Create an original electronic contraption out of old electronic devices.

Content-Based

4. Demonstrate an abstract understanding of ICs, microcontrollers, and computers.
5. Explain the general operation of complex electronic systems in simple words.
6. Interpret electronic datasheets.

Assessment

Students will submit a report and/or video of their mid semester teardown (30%) and final reconstruction project (30%). Grading rubrics for the teardown and reconstruction will be provided when the project is assigned. The mid semester teardown report and/or video will explain the general operating principle of the electronic system the student took apart, identify and explain the operation of sub-systems, identify certain discrete electronic components and detail their specifications, as well as provide some ideas on what the old electronic device could be repurposed as. The final reconstruction project will assess students' creativity and skills in designing and fabricating an original electronic contraption out of old electronic devices.

A take-home midterm (15%) and final exam (15%) will be provided in the option of written and/or oral medium at the instructor's discretion. Note that exams may be moved to in class at the discretion of the instructor. Exams will primarily assess the students understanding of electronic components and their operation. The exams will also assess theoretical understanding of using common electronic measurement and fabrication equipment as well as interpretation of electronic datasheets.

Pre-class assignments in the form of videos and short quizzes consisting of multiple choice and/or open-ended questions will be due 48 hours before classes. Pre-class assignments will be assessed on completion (5%) and quality of answers (5%). The pre-class assignments are primarily to aid in the students understanding of class material. Feedback will be provided in class and through Canvas.

Assignment	**Grade**
Report/video of mid semester teardown	30%
Report/video of final reconstruction project	30%
Midterm exam	15%
Final exam	15%
Pre-class assignment	10%

Course Material

There will be no required text for the course. Instead, videos will be posted on Canvas. A recommended textbook that will aid students understanding and satisfy curiosity is Make: Electronics 2nd edition by Charles Platt.

A material fee of $20 is required for the course and will go towards purchase of a breadboard and electronic components. If you are unable to pay the material fee, please inform the instructor. Students who wish to send a printed circuit board for manufacturing during the course will cover their individual costs.

Student Responsibilities

Come with and open-minded attitude to learn and participate actively in class. Attendance is required. Poor attendance could result in a penalty to your grade. Valid reasons *prior* to class will be accepted on a case by case basis. Submit work on time; this is to ensure that you are up to speed with the class. Late work might be accepted on a case by case basis with valid reason at least 24 hours *prior* to the deadline.

Rice Honor Code

We shall abide to the Rice Honor Code, detailed in the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/.

Disability Support
If you have a disability, please speak to Disability Support Services (Allen Center Room 111, adarice@rice.edu, x5841). Also, speak to the instructor and accommodations will be made to ensure your ability to learn in the class.